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- (a) forming a monomer stream that contains an acrylic monomer and a polyether macromonomer; an initiator stream that contains a free radical initiator; and, optionally, a chain transfer agent stream;
 - (b) polymerizing the streams in a [reaction zone] reactor at a temperature within the range of about -200C to about 1500C, and
 - (c) withdrawing a polymer stream from the reaction zone.

REMARKS

This application is a continuation of Application Serial Number 09/358,009, and is being filed under 37 C.F.R. § 1.53(b)(1). Claims 16-20 from the original application have been allowed and are cancelled in this response. Claim 1 is amended. Applicants, in this response, traverse the Examiner's previous rejections of claims 1-16.

I. Anticipation and Obviousness Rejections over Nagano

In the parent application, the Examiner rejected claims 1-5 and 8-13 under 35 U.S.C. §102(e) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over U.S. Pat. No. 5,834,576 (Nagano). Instant claim 1 is an independent claim; claims 2-5 and 8-13 depend from claim 1. Claim 1 defines a process that comprises three steps: (a) forming a monomer stream containing an acrylic monomer and a polyether macromonomer; an initiator stream; and, optionally, a chain transfer agent stream; (b) polymerizing the streams; and (c) continuously withdrawing a polymer stream.

The Examiner stated that Nagano discloses method for preparing comb copolymers of an acrylic monomer and a polyether macromonomer. See page 3 of the Office Action, mailed September 19, 2000. Applicants agree.

Indeed, Applicants have incorporated Nagano as prior art teachings in the Background of Invention. See *lines 26-28, page 1 and lines 10-17, page 2 of the instant application.*

However, Nagano does not teach the continuous process claimed by Applicants. In its 19 pages, 39 columns of SUMMARY OF THE INVENTION (from column 2 to column 40), Nagano gives only one sentence that relates to a continuous process: "The solution polymerization can be performed batch-wise or continuously." See *column 23, lines 52-53*. The Examiner cites this sentence in her rejection. See *page 4 of the Office Action.*

The Examiner observed (see *page 4 of the Office Action*) that Nagano also teaches:

- (i) a free radical polymerization in the presence of initiators such peroxides, persulfates, and azo compounds, which can be dissolved in organic solvents; *Column 24, lines 1-16;*
- (ii) the reaction temperature is preferably within the range from 0° C to 120° C; *Column 24, lines 22-25;*
- (iii) Nagano polymers can be used as cement dispersing agent. *Column 35, lines 10-15.*

The Examiner admitted: "Although Nagano et al disclose a continuous method of preparation of comb copolymers . . . , Nagano does not specify the steps of the process." Nevertheless, she concluded, incorrectly: "the process steps claimed by Applicants . . . teaches conventional continuous polymerization, which is in general clearly stated in Nagano's disclosure. Therefore, it would have been obvious . . . that all the embodiments would be operable within the scope of Patentees invention " See *page 4, the Office Action.*

First, Applicants respectfully traverse the rejection under 35 U.S.C. §102(e). As the Examiner admits, Nagano does not teach the steps of the

process. In fact, Nagano does not even provide general teachings about continuous polymerization process. The single sentence disclosed by Nagano, "The solution polymerization can be performed batch-wise or continuously," expresses no preference for a continuous polymerization. Moreover, the additional disclosures of polymerization conditions cited by the Examiner, i.e., the types of initiators and temperature range (see (i) and (ii) above) apply to almost any free radical polymerization, including batch process. (See *Odian, G., Principle of Polymerization, Chapter 3, John Wiley and Sons, New York, NY, 2nd Ed., 1981*, p.179, a copy of relevant parts attached).

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference." MPEP § 2131; *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The instant claims are not anticipated by Nagano because Nagano fails to teach the steps of the claimed process (i.e., (a) forming monomer, initiator, and optional chain transfer streams, (b) polymerizing the streams and (c) withdrawing a polymer stream).

Second, Applicants traverse the obviousness rejection. The Examiner said that all the embodiments of Nagano would have made Applicants' claimed invention obvious. Applicants respectfully disagree. In DESCRIPTION OF THE PREFERRED EMBODIMENTS, Nagano discloses 28 examples and 4 comparative examples, but no example or comparative example discloses a continuous polymerization process. Rather, the polymerization process disclosed in all of the examples is only a batch process (see Examples 3, 4, 7, 9, 11, 12, and 21). The general process repeatedly stated by Nagano in the examples is that "by heating the acrylic

ester compound to 80° C, polymerization was performed so as to yield a polymer." See, e.g., *Example 3*.

"The determination of whether a *prima facie* case of obviousness has been made is a critical decision that controls the evidentiary procedures and burdens before the PTO." *In re Geiger*, 815 F.2d 686, 690, 2 USPQ2d 1276, 1279 (Fed. Cir. 1987). Here, the Examiner fails to establish the obviousness of the instant invention over Nagano because the art provides no motivation to modify Nagano's teachings about batch polymerization to incorporate the continuous process steps of Applicants' claims.

In addition, even if Nagano could support a *prima facie* case of obviousness for a continuous process, Applicants have successfully rebutted any such case. As shown in Examples, comb polymers made by the continuous process of the invention (see Examples 1 and 2) give cement admixtures having significantly higher slump and flow properties than those made by a batch process (Comparative Examples 3 and 4) (see Table 1, page 11).

In sum, the anticipation rejection is incorrect because Nagano does not disclose any of the claimed process steps. Also, the Examiner fails to establish a *prima facie* case of obviousness because Nagano provides disclosure only for a batch process. Moreover, Applicants have successfully rebutted any *prima facie* case of obviousness by showing the advantages of the continuous process of the invention versus a batch process.

II. Obviousness Rejection over Nagano in Combination with Nagasawa

In the parent application, the Examiner also rejected claims 6, 7, 11, 14, and 15 under 35 U.S.C. § 103(a) as being unpatentable over Nagano in combination with U.S. Pat. No. 5,310,813 (Nagasawa). The rejected claims depend from claim 1 and cover the use of chain transfer agents.

The Examiner correctly pointed out that Nagano is silent about the use of chain transfer agents. She also correctly said that Nagasawa teaches a process for preparing branched polymers from a macromonomer. Nagasawa teaches the use of chain transfer agents to control molecular weight of branched polymers.

The Examiner concluded: "it would have been found obvious . . . to utilize the mercaptan chain transfer agents utilized for branched polymers of Nagasawa in the process of Nagano . . ." However, even if the Examiner's conclusion is correct, using Nagasawa's chain transfer agents in Nagano's process can only make a batch process obvious because, as discussed in the previous section, Nagano only teaches a batch process for making comb polymers.

It is worth noting that Nagasawa does not teach a continuous process either. Nagasawa discloses 4 examples (Examples 1-4, columns 8-9) for preparing branched polymers. Nagasawa's process is exclusively conducted batch-wise. For instance, in Example 1, Nagasawa dissolves all components (the macromonomer, styrene, MMA, the initiator AIBN) in toluene, and then subjects the solution to polymerization at 60°C for 8 hours.

35 U.S.C. § 103(a) provides: "A patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious . . ." Thus, the obviousness of Applicants' invention over the combined teachings of Nagano and Nagasawa cannot be established because the subject matter of the instant invention is a continuous process for making comb copolymers, while the combined teachings of Nagano and Nagasawa are limited to a batch process.

Moreover, even if combining Nagano and Nagasawa could establish a *prima facie* case of obviousness, Applicants have successfully rebutted any

such case by demonstrating significant and unexpected advantages of the claimed continuous process.

Applicants respectfully ask the Examiner to reconsider and withdraw all the rejections in the parent application, allow claims 1-15 of this continuation, and to pass the application to issue. Applicant invites the Examiner to telephone their agent, Dr. Shao Guo at (610) 359-6059 if a discussion of the application might be helpful.

Respectfully submitted,
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